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ATTACHMENT D  
SCOPE OF WORK FOR CORRECTIVE MEASURES STUDY  
ADMINISTRATIVE ORDER ON CONSENT  
U.S. EPA DOCKET NO.

The purpose of this Corrective Measure Study (CMS) is to identify and evaluate and recommend potential corrective measure alternatives for the releases that have been identified at the Site.

The scope of the CMS will depend on the needs at the Site as determined by the Site Investigation; EPA may determine that an abbreviated CMS is sufficient for the Site. Deviations from this Scope of Work may be made only with prior EPA approval, based on the findings of the Site Investigation. In general, the CMS will consist of the following four tasks:

**TASK 1: IDENTIFICATION AND DEVELOPMENT OF CORRECTIVE ACTION ALTERNATIVES**

Based on the results of the Site Investigation, Respondent shall identify, screen, and develop alternatives for removal, containment, treatment, and/or other remediation of the contamination based on the objectives established for the corrective action.

**A. Description of Current Situation**

Respondent shall submit an update to the information describing the current situation at the Site and the known nature and extent of the contamination as documented by the Site Investigation. Respondent shall also make a site-specific statement of the purpose for the corrective measures, based on the results of the Site Investigation. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by corrective measures.

**B. Screening of Corrective Measure Technologies**

Respondent shall review the results of the Site Investigation and identify and describe technologies which might be suitable for application at the Site, given the nature and extent of contaminants and the risk posed to the receptors. Respondent shall screen corrective measure technologies and any supplemental technologies to eliminate those that may prove infeasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measure objectives within a reasonable time period. This screening process shall focus on eliminating those technologies which have severe limitations for a given set of waste and site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations.

Site, contaminant, and technology characteristics which are used to screen inapplicable technologies are described in more detail below:

**1. Site Characteristics**

Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Any technology which is clearly precluded from use by Site characteristics should be eliminated from further consideration.

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2. Contaminant Characteristics

Identification of contaminant characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by contaminant characteristics at the Site may be eliminated from consideration. Contaminant characteristics particularly affect the feasibility of on-site methods, direct treatment methods, and land disposal; and,

3. Technology Limitations

During the screening process the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that have proven to be unreliable, perform poorly, or have not been fully demonstrated in the field at other sites, may be eliminated in the screening process.

C. Identification of Corrective Measure Alternatives

Respondent shall develop the corrective measure alternatives based on the corrective action objectives and analysis of corrective measure technologies. Respondent shall rely on engineering practice to determine which of the identified technologies appear most suitable for the site. Technologies can be combined to form the overall corrective action alternatives. The alternatives developed and presented in the Report should represent a workable number of options that each appear to adequately address all site problems and corrective action objectives. Each alternative may consist of an individual technology or a combination of technologies. Respondent shall document the reasons for excluding technologies.

TASK 2: EVALUATION OF CORRECTIVE MEASURE ALTERNATIVE(S)

Respondent shall describe each corrective measure alternative that passes through the initial screening in Task 1 and evaluate each corrective measure alternative and its components. The evaluation shall be based on technical, environmental, human health, and institutional concerns. Respondent shall also develop cost estimates of each corrective measure.

A. Technical/Environmental/Human Health/Institutional

Respondent shall provide a description of each corrective measure alternative. In addition, for each corrective measure provide an evaluation which includes but is not limited of the following factors:

1. Technical

Respondent shall evaluate each corrective measure alternative based on performance, reliability, implementability, and safety.

a. Respondent shall evaluate performance based on the effectiveness and useful life of the corrective measure:

(1) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, diversion, removal, destruction, and/or treatment. The effectiveness of each corrective measure shall be determined either through design specifications or by performance evaluation. Any specific waste or Site characteristics which could potentially impede effectiveness shall be considered. The evaluation should also consider the effectiveness of combinations of technologies; and,

(2) Useful life is defined as the length of time the level of effectiveness can be



maintained. Many corrective measure technologies deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each corrective measure shall be evaluated in terms of the projected service lives of its component technologies. Resource availability in the future life of the technologies, as well as appropriateness of the technologies, must be considered in estimating the useful life of the project.

- b. Respondent shall provide information on the reliability of each corrective measure alternative including their operation and maintenance requirements and their demonstrated reliability:
  - (1) Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activity should be regarded as less reliable than technologies requiring little or straightforward operation and maintenance. The availability of labor and materials to meet these requirements shall also be considered; and,
  - (2) Demonstrated and expected reliability is a way of measuring the risk and effect of failure. Respondent shall evaluate, at a minimum: whether the technologies have been used effectively under similar conditions; whether the combination of technologies have been used together effectively; whether failure of any one technology has an immediate impact on receptors; and whether the corrective measure has the flexibility to deal with uncontrollable changes at the Site.
- c. Respondent shall describe the implementability of each corrective measure alternative including the relative ease of installation (constructability) and the time required to achieve a given level of response;
  - (1) Constructability is determined by conditions both internal and external to the Site conditions and include such items as location of underground utilities, depth to water table, heterogeneity of subsurface materials, and location of the Site (e.g., remote location vs. a congested urban area). Respondent shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities; and,
  - (2) Time has two components that shall be addressed: the time it takes to implement a corrective measure; and the time it takes to actually see beneficial results. Beneficial results are defined as the reduction of contaminants to some pre-established level, acceptable to EPA.
- d. Respondent shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments as well as those to workers during implementation. Factors to consider include fire, explosion, and exposure to hazardous substances.

2.

#### Environmental

Respondent shall perform an Environmental Assessment for each corrective measure alternative. The Environmental Assessment shall focus on the Site conditions and pathways of contamination actually addressed by each alternative. The Environmental Assessment for each alternative will include, at a minimum, an evaluation of: the short and long-term



beneficial and adverse effects of the response alternative; adverse effects on environmentally sensitive areas or receptor; and an analysis of measures to mitigate adverse effects.

3. Human Health

Respondent shall assess each corrective measure alternative in terms of the extent to which it mitigates short and long-term exposure to any residual contamination and protects human health both during and after implementation of corrective measure. The assessment will describe the levels and characterizations of contaminants on Site, potential exposure routes, and potentially affected population. Each alternative will be evaluated to determine the level of exposure to contaminations and the reduction over time. For management of mitigation measures, the relative reduction of impact will be determined by comparing residual levels of each alternative with existing criteria, standards, or guidelines acceptable to EPA.

4. Institutional

Respondent shall assess relevant institutional needs for each alternative. Specifically, the effects of federal, state, and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations on the design, operation, and timing of each alternative.

B. Cost Estimate

Respondents shall develop an estimate of the cost of each corrective measure alternative including the cost for each phase of the corrective measure. The cost estimate shall include but not be limited to, capital costs and operation and maintenance costs.

TASK 3: JUSTIFICATION AND RECOMMENDATION OF CORRECTIVE MEASURES

Respondent shall justify and recommend one or more corrective measure alternatives using technical, human health, and environmental criteria. This recommendation shall include summary tables which allow the alternatives to be understood and compared easily. Trade-offs among health risks, environmental effects, and other pertinent factors shall be highlighted. EPA will select the corrective measures based on the results of Tasks 2 and 3. At a minimum, the following criteria will be used to justify the final corrective measures:

A. Technical

1. Performance -- Corrective measures which are most effective at performing their intended functions and maintaining the performance over extended periods of time will be given preference;
2. Reliability -- Corrective measures which do not require frequent or complex operation and maintenance activities, and that have proven effective under waste and Site conditions similar to those anticipated will be given preference;
3. Implementability -- Corrective measures which can be constructed and operated to reduce levels of contamination to attain or exceed applicable standards in the shortest period of time will be preferred; and,
4. Safety -- Corrective measures which pose the least threat to the safety of nearby residents and environments as well as workers during implementation will be preferred.

B. Human Health



Corrective measures must comply with existing EPA criteria, standards, or guidelines for the protection of human health. Corrective measures which provide the minimum level of exposure with time are preferred.

C. Environmental

Corrective measures must comply with existing EPA criteria, standards or guidelines for the protection of ecological receptors. Corrective measures providing the greatest environmental protection and posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be favored.

TASK 4: REPORTS

Respondent shall prepare a Corrective Measure Study Report presenting the results of Tasks 1 through 3 and recommending a corrective measure alternative.

A. Draft

The Report shall, at a minimum, include:

1. A description of the Site, a site topographic map, and preliminary layouts;
2. A summary of each corrective measures, including:
  - a. Description of the corrective measure or measures and rationale for selection;
  - b. Performance expectations, including an evaluation of the overall protectiveness of human health and the environment, ability to attain the corrective action objectives, ability to control the sources of releases, and an assessment of short-term and of long-term reliability and effectiveness, including, but not limited to, the methodology used to estimate the short-term and long-term reduction of toxicity, mobility, or volume of waste and the resulting estimate;
  - c. Preliminary design criteria and rationale, including an estimate and analysis of quantity, volume, and/or toxicity of the waste generated, including, but not limited to, contaminated soil, sludge, and groundwater, and methods to minimize the volume, toxicity, and/or mobility of waste to be generated;
  - d. General operation and maintenance requirements; and
  - e. Long-term monitoring requirements;
3. A summary of the Site Investigation and impact on the recommended corrective measure or measures:
  - a. Field studies (groundwater, surface water, soil, air); and,
  - b. Treatability studies (bench scale, pilot scale), if any;
4. Design and Implementation Precautions:
  - a. Special technical problems;
  - b. Additional engineering and other data required;



- c. Permits and regulatory requirements, including an assessment of how institutional and legal requirements including federal, State, or local environmental or public health standards, regulations, and/or ordinances will affect the design, operation, and timing of each corrective measure studied;
  - d. Access, easement, right-of-way;
  - e. Health and safety requirements; and,
  - f. Public involvement activities.
5. Cost Estimates and Schedules:
- a. Capital cost estimate;
  - b. Operation and maintenance cost estimate; and,
  - c. Other costs
  - d. Project schedule (design, construction, operation).
6. A recommendation as to which corrective measure(s), in Respondent's opinion, are the most appropriate, and the rationale for such recommendation.

B. Final

Respondent shall finalize the Corrective Measure Study Report incorporating comments received from EPA on the Draft Corrective Measure Study Report, as set forth in the Order.